Hard X-ray Scanning Fluorescence Microscopy

Beamline: X13B

Technique: Microscopy

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Motivation: Imaging with hard X-rays has certain advantages, such as elemental contrast, potentially higher spatial resolution than optical microscopy, and an ability to observe thicker samples than electron microscopy. While it is desirable to perform full field imaging, we are able, as an intermediate step to perform imaging in the scanning mode. We take two linear kinoform lenses, cross them as shown in Figure 1 to obtain a focused spot of 0.6 by 4 microns.Then, by raster scanning the sample and detecting the fluorescence or transmitted signal one can construct a projection image.

Results: The fluorescence image shown in Figure 2 is of a standard TEM grid. A coarse, large field of view image shows the grid clearly, and is taken with a pixel to pixel spacing of 20microns. A finer mesh with a 2 micron pixel spacing is shown in the inset. The fluorescence signal is due to the copper in the TEM grid.

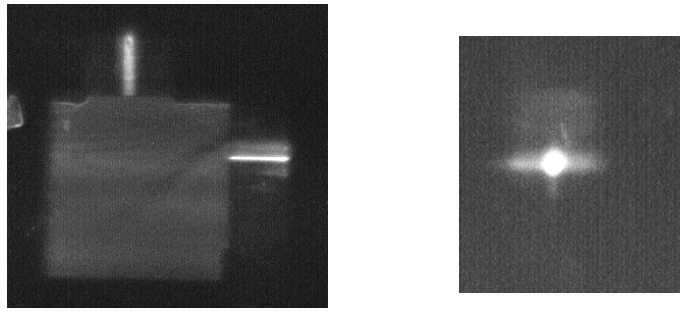

Figure1. a) Two orthogonal linear lenses physically separated, and b) the resulting 0.6 micron by 4 micron spot when they are superimposed.

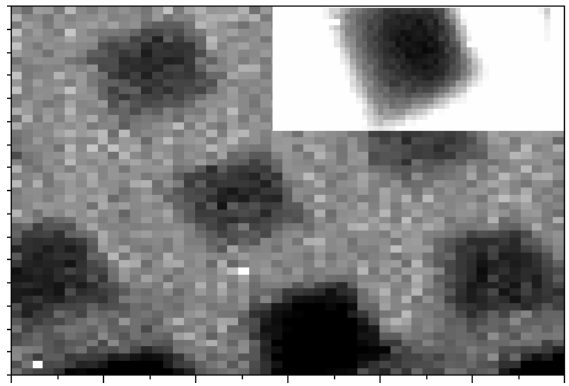

Figure 2. First data from fluorescence imaging a copper TEM grid with crossed pair of kinoform lenses at X13B. The incident photon energy was 11.3 keV.